permitting the circulation of air from beneath. A box, four inches in height, upon which the oven rests, encloses the flame; in it an opening, with a movable cover, is left, to light the gas and watch the flame when necessary. The top of the oven has an additional opening, for the insertion of a thermometer, to regulate the heat when adjusting the sliding tube.

Fig. 2 represents the end of the sliding tube in its proper size. The hole, *a*, through which the gas passes to the burner when the extremity is closed, must be of such a size that merely enough gas passes to prevent the extinction of the light. It is made by heating the tube by a pointed flame, and touching it with a red-hot platinum wire, by which means a small tube may be drawn out, which when broken leaves a small hole; this hole is then melted together in the flame until after trial in the apparatus it is found small enough.

I found no difficulty in keeping within a degree of the temperature required; of course, the delicacy of the apparatus is in proportion to the difference between the contents of the air receiver and the diameter of the long arm of the air thermometer, and owing to increase of pressure, the higher the mercury in this arm the more slowly will it rise by increase of temperature.

For the Journal of the Franklin Institute.

Explosions on board the Steamers Fusileer and Shreveport. By A. C. Jones.

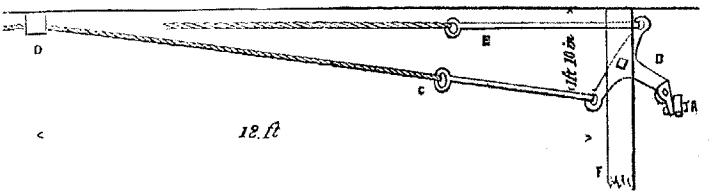
To the Committee on Publications.

Gentlemen:—In the early part of January, an explosion took place on board the Attakapas packet *Fusileer*. It occurred in the Gulf, a short time after leaving the Mississippi river, on her way to Attakapas, and is said to have been caused by gross mismanagement, coupled with drunkenness. The boat was towed to her place of destination, thereby evading an examination into the causes which resulted in the loss of life. This was the first in this vicinity under the new law; and of the second I will now furnish you with the particulars.

The steamer *Shreveport*, on the 20th, in attempting to back out from a landing on Red river, collapsed the inside flue of the larboard boiler, scalding the second engineer and carpenter, who were aft on duty, and injuring a fireman, who was firing at the time.

The boat has a stern wheel, and the engines and "doctor" are consequently near the stern of the boat, leaving about fifty feet space between them and the after ends of the two boilers. The steam gauge, capable of indicating 200 pounds to the square inch, is connected with the steam pipe above where it branches to the engines. There is here also a supplemental screw valve and pipes for blowing off steam from the boilers through the main steam pipe; this valve had been put on the trip before. A small steam drum connects the two boilers at the after end, the safety valve being over the starboard boiler, and the steam pipe over the larboard one. The accompanying sketch gives the contrivance for either raising or holding the end of the safety valve lever down, and is of the

roughest description of workmanship. Where it is attached to the end of the safety valve lever, it gives eight leverages, the fixed weight inside of it being 7½ to 1. Cords from each end of the bent lever pass through small holes in three wooden cleats, (out of line with each other sideways,) fastened to the carlins above.



a, end of safety valve lever; *b*, bent lever, each arm is 8½ inches long; *c*, small rod and cord for holding the lever down; *d*, first wooden cleat; *e*, cord for raising lever; *f*, stancheon through which the bent lever works.

At D, in the sketch, it will be seen that the angle of the cord for holding the lever down is considerable, and yet there is no rounding of the small hole to compensate for this deviation from a straight line; the lines finally pass over two-inch sash pulleys down to the side of the starboard engine. To the end of the cord for holding down the valve, is tied *permanently* the half of a cam, (about 30 lbs.) Now, one pound on the end of this cord, by its zigzag course and swelling by the wet weather, which has prevailed for some time past, and the roughness of all the parts in connexion with it, will give many pounds on the end of the lever; in fact, to all intents and the purposes of a safety valve, making it useless, *the valve being perfectly locked.*

This was the first trip of both engineers on this boat, and they were fully provided with certificates from the inspectors of this place, attesting their competency!

The boat had stopped at a landing over fifteen minutes, and steam had been blown off *only* through the valve mentioned, which is too small for the purpose, as it could not discharge steam as fast as the boilers could make it. *They had stopped blowing for about two minutes*, and before a part of a turn of the wheels was made to back out, the flue collapsed, and most of the water was discharged aft. The boilers have been about four months in use.

On examination, I found the flue to be flattened nearly vertically its whole length, and lying up against the other flue. It is partly torn off from the after wrought iron head; the other end is half torn off in the lap, a quarter sheet in length from the head, which is much "buckled," apparently by the great pressure on its surface.

The flues are fourteen inches in diameter; the iron is *three-sixteenths* of an inch in thickness, and is of a medium quality. There is a two inch water space between the flue and the shell. Each boiler has three gauge cocks, the lowest one being about one inch above the tops of the flues; the water line is well defined, and is above the lower gauge cock. That there was plenty of water at the time, is borne out by the appearance of things around, and by the fact of the men at the engines, fifty feet from

the boilers, being scalded, although they were partially protected by a large quantity of freight on the deck.

The true cause was a pressure exceeding the resistance of flues of this diameter, only three-sixteenths of an inch in thickness.

I have before given my opinion of the impropriety of having the water space between the flue and shell so small; and although in this case it was two inches, being more space than a great many boilers in use have, yet the collapsed flue bears evidence of the softening effect, from the great amount of steam bubbles forming on its surface, or the repulsion of the water from this contracted space by the action of the fire on both its sides.

It is said that the inspectors have revoked the certificates of both engineers. This is no more than right; but it is rather late to punish these persons after the injury is done, considering the very loose manner in which "qualified engineers" were made. The inspectors have directed a new flue of the same thickness to be put in; so that it is probable that these boilers may be heard from again.

The new law giving ample power to the inspectors over the details of the boilers, there will be some hope of the removal of the cast iron steam connexion pipes, used on many of the boats of this section, some of which, in addition to the unavoidable settling of the boilers, use these cast iron pipes or steam drums *for the stancheons to set on* for the support of the cabin floor, this part of which is often used for the stowage of the trunks and light freight of the passengers. Several instances have come under my notice of the breaking of these pipes, in which loss of life resulted therefrom.

New Orleans, March 26, 1853.

For the Journal of the Franklin Institute.

Flying—Balloon—Parachutes.

When will the flying of insects and of birds be taken up for investigation by naturalists; or are the mechanisms and actions of their wings—than which no department of natural science offers stronger inducements—to be still thrown aside for the determination of species and genus, and to the accumulation of technical and minute details that have no bearings on truths precious to the engineer. It is marvelous that they have been so long neglected, and the more so, that few zoologists, if any, are yet awake to the fact that the contrivances by which power is conveyed and applied through the organs of motion in animals, involve mechanical novelties and problems in physics of surpassing interest and lasting value. Had they been appreciated, their solution had been attempted ere now. But a spirit of inquiry has arisen, and the demands for practical science have been so urgent, that the laws which govern the flight of birds through the air, and of fishes through water, cannot be much longer neglected. And certainly, on more pleasing and profitable fields of discovery neither the natural nor the mechanical philosopher never entered.

Obvious, palpable, and ever occurring, as are the movements of birds and insects in the atmosphere, there is much in them that is inexplicable; much at all events which I cannot explain; whilst the constant repetition